Ordering number: EN 3979

Monolithic Linear IC



No. 3979

LA1883M

Single-chip FM/AM Tuner for Car Radio and Home Stereo Equipment

OVERVIEW

The LA1883M is a single-chip stereo FM/AM tuner system IC for use in car radio and home stereo equipment. It features higher performance and 30% fewer external components than current devices.

The LA1883M is a basic FM/AM tuner block on a single chip. It comprises FM front end, FM IF, MPX, noise canceller, AM and AM/FM switch.

The LA1883M operates from a 7.5 to 9.2 V supply and is available in 64-pin QIPs.

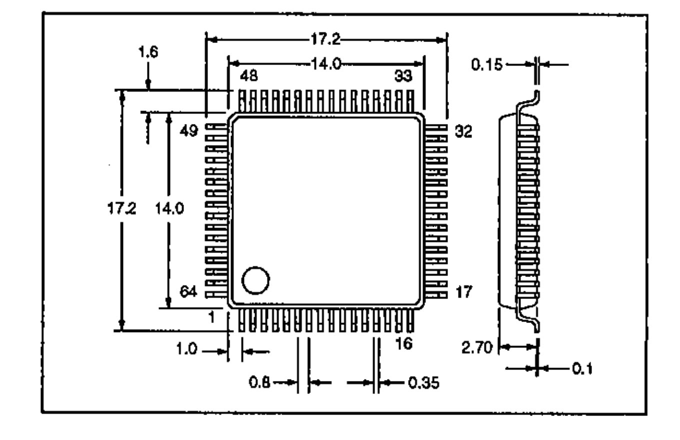
FEATURES

- Single-chip stereo FM/AM tuner
- FM front end, FM IF, MPX, noise canceller, AM and FM/AM switch
- Higher performance and 30% fewer external components than current devices.
- High FM front end to FM IF stage isolation
- 7.5 to 9.2 V supply
- 64-pin QIP

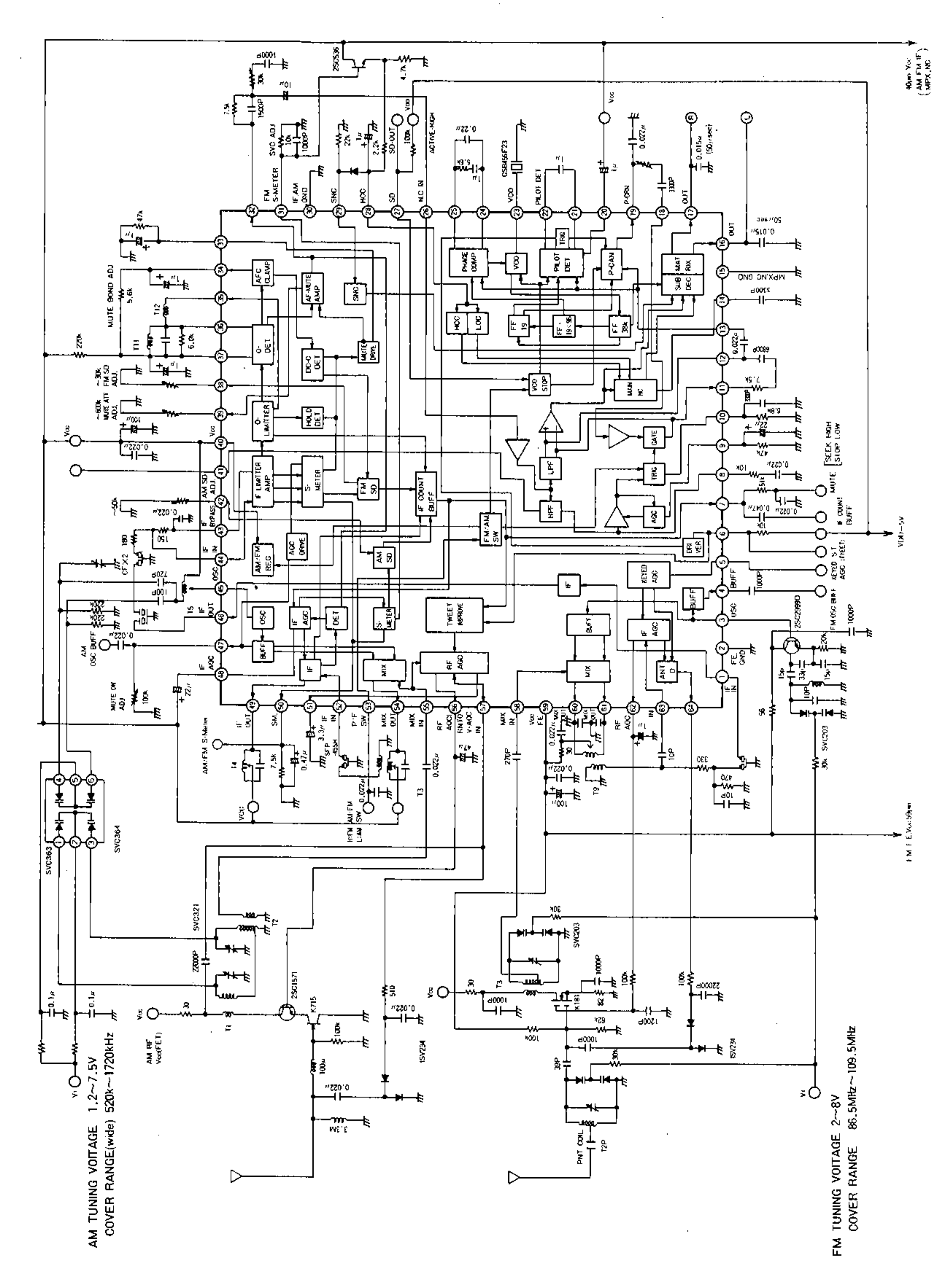
PACKAGE DIMENSIONS

Unit: mm

3159-QIP64E



BLOCK DIAGRAM



Unit (resistance: Ω, capacitance: F)

SPECIFICATIONS

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	9.5	V
Power dissipation	P_D	950	mW
Operating temperature range	Topr	–30 to 85	°C
Storage temperature range	T_{stg}	–40 to 150	°C

Recommended Operating Conditions

T_a = 25 °C

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	8.5	V
Supply voltage range	V_{CC}	7.5 to 9.2	V
STEREO INJ supply voltage	$V_{CC\ STEREO\ INJ}$	5	V

Electrical Characteristics

FM IF

V_{CC} = 8.5 V, T_a = 25 °C, f_C = 10.7 MHz

Parameter	Symbol	Condition	Rating			Unit
			min	typ	max	
Demodulator output voltage	V_{OFM}	f_m = 1 kHz, 100% modulation, V_I = 80 dBμ	180	280	380	mV
Channel balance	CB	f_m = 1 kHz, 100% modulation, V_I = 80 dBμ	–1	0	1	dB
FM total harmonic distortion	THD_{FM}	f = 1 kHz, 100% modulation, V_I = 80 dBμ	–	0.5	1.2	%
Signal-to-noise ratio	$S/N_{FM\ IF}$	f = 1 kHz, 100% modulation, V_I = 80 dBμ	68	75	-	dB
AM suppression ratio	AMR	f = 1 kHz, f_m = 1 kHz, 30% AM modulation, V_I = 80 dBμ	56	69	–	dB
Muting attenuation	α_{MUTE}	f = 1 kHz, V_I = 80 dBμ. V_{33} changed from 0 to 2 V.	5	10	15	dB
		f = 1 kHz, V_I = 80 dBμ. V_{33} changed from 0 to 4 V.	19	24	29	
Separation	SEP	See note 2.	35	45	–	dB
Stereo LED turn-ON pilot tone modulation	ST_{ON}	V_6 < 1.5 V	2.5	3.7	6.6	%

Parameter	Symbol	Condition	Rating			Unit
			min	typ	max	
Stereo LED turn-OFF pilot tone modulation	ST_{OFF}	V_6 < 3.5 V	1.5	2.7	-	%
Main channel total harmonic distortion	THD_{main}	See note 2.	–	0.4	1.5	%
Pilot signal cancellation level	P_{CAN}	10% pilot signal, V_I = 80 dBμ, Pilot-level leakage DIN-AUDIO measurement	15	22	–	dB
SNC output voltage	V_{OSUB}	V_I = 80 dBμ, V_{31} = 0.1 V. See note 2.	-	–	5	mV
SNC output attenuation	α_{SNC}	V_I = 80 dBμ. V_{31} changed from 3.0 to 0.6 V. See note 2.	0	4	8	dB
HCC output attenuation	α_{HCC}	V_I = 80 dBμ, f = 10 kHz. V_{28} changed from 3.0 to 0.6 V. See note 2.	0.5	4.5	8.5	dB
		V_I = 80 dBμ, f = 10 kHz. V_{28} changed from 3.0 to 0.1 V. See note 2.	20	24	28	
Input –3 dB limiting voltage	V_{ILIM}	Referred to V_I = 80 dBμ.	33	40	47	dBμ
Muting sensitivity	V_{IMUTE}	Unmodulated signal, V_{33} = 2 V	27	35	43	dBμ
SD sensitivity	$SD_{SEN\ MPX}$	Unmodulated signal. IF count buffer is ON (V > 100 mV).	60	72	84	dBμ
		Unmodulated signal. SD is ON.	60	72	84	
IF count buffer output voltage	$V_{IF\ BUFF\ FM}$	Unmodulated input and output, $V_{FM\ IF}$ = 100 dBμ	170	260	400	mV
S-meter output voltage	$V_{SM\ FM}$	No signal	0	0.4	1.0	V
		V_I = 50 dBμ	1.0	1.9	3.0	
		V_I = 70 dBμ	1.9	3.4	5.5	
		V_I = 100 dBμ	3.3	5.2	6.9	
Muting bandwidth	BW_{MUTE}	V_I = 100 dBμ, V_{33} = 2 V unmodulated wideband signal	150	230	330	kHz

Notes

1. Mounted in Yamaichi Electrical Industries' IC-51-0644-824 or KS8277 IC socket
2. f_I comprises 90% left and right signals, and 10% pilot signal.

FM front end

V_{CC} = 8.5 V, T_a = 25 °C

Parameter	Symbol	Condition	Rating			Unit
			min	typ	max	
RF AGC turn-ON input voltage	V_{IAGC}	V_{64} = 0.7 V	65	72	79	dBμ
Conversion voltage gain	A_V	$V_{MIX\ IN}$ = 70 dBμ at 98 MHz with no modulation	74	118	187	mV
OSC BUFF output voltage	$V_{OSC\ BUFF\ FM}$	No signal, f_{OSC} = 108.7 MHz, V_t = 4.6 V	130	200	270	mV
FM section quiescent supply current	I_{CCOFM}	No signal. $I_{40} + I_{49} + I_{54} + I_{60} + I_{61}$	54	77	95	mA

Noise canceller

V_{CC} = 8.5 V, T_a = 25 °C

Parameter	Symbol	Condition	Rating			Unit
			min	typ	max	
Gate time	τ_{GATE}	$V_{NC\ IN}$ = 100 mV peak at f = 1 kHz, 1 μs pulse	15	25	35	μs
Noise sensitivity	N_{SEN}	1 kHz, 1 μs pulse input level when noise canceller is ON	–	–	30	mV_p

AM

V_{CC} = 8.5 V, T_a = 25 °C, $f_{AM\ ANT}$ = 1 MHz unless otherwise noted

Parameter	Symbol	Condition	Rating			Unit
			min	typ	max	
Usable sensitivity	S	$V_{AM\ ANT}$ = 27 dBμ, f_m = 1 kHz, 30% modulation	16	20	–	dB
Detector output voltage	V_{OAM}	$V_{AM\ ANT}$ = 74 dBμ, f_m = 1 kHz, 30% modulation	85	120	170	mV
AGC figure-of-merit	V_{AGCFOM}	Referred to $V_{AM\ ANT}$ = 74 dBμ, change in input required for output to fall 10 dB	52	57	62	dB
Signal-to-noise ratio	S/N_{AM}	$V_{AM\ ANT}$ = 74 dBμ, f_m = 1 kHz, 30% modulation	45	50	–	dB
Total harmonic distortion	THD_{AM}	$V_{AM\ ANT}$ = 74 dBμ, f_m = 1 kHz, 80% modulation	–	0.4	1.0	%
S-meter output voltage	$V_{SM\ AM}$	No signal	–	0	0.3	V
		$V_{AM\ ANT}$ = 100 dBμ, unmodulated	3.3	4.7	7.0	V
OSC BUFF output voltage	$V_{OSC\ BUFF\ AM}$	No signal	310	370	–	mV

Parameter	Symbol	Condition	Rating			Unit
			min	typ	max	
Wideband-AGC sensitivity	W-AGC_{SEN}	$f_{AM\ ANT}$ = 1.4 MHz, V_{57} = 0.7 V	93	99	105	dBμ
SD antenna input level sensitivity	$SD_{SEN\ AM}$	IF count output is ON.	23	30	37	dBμ
		SD is ON.	23	30	37	
Tweet reduction circuit antenna input level sensitivity	$Tweet_{SEN}$	N_6 = 0 V, AGC ON input	50	56	62	dBμ
IF BUFF output voltage	$V_{IF\ BUFF\ AM}$	$V_{AM\ ANT}$ = 74 dBμ, unmodulated	200	260	-	mV

Measurement Circuit

